
Robot Programming #6

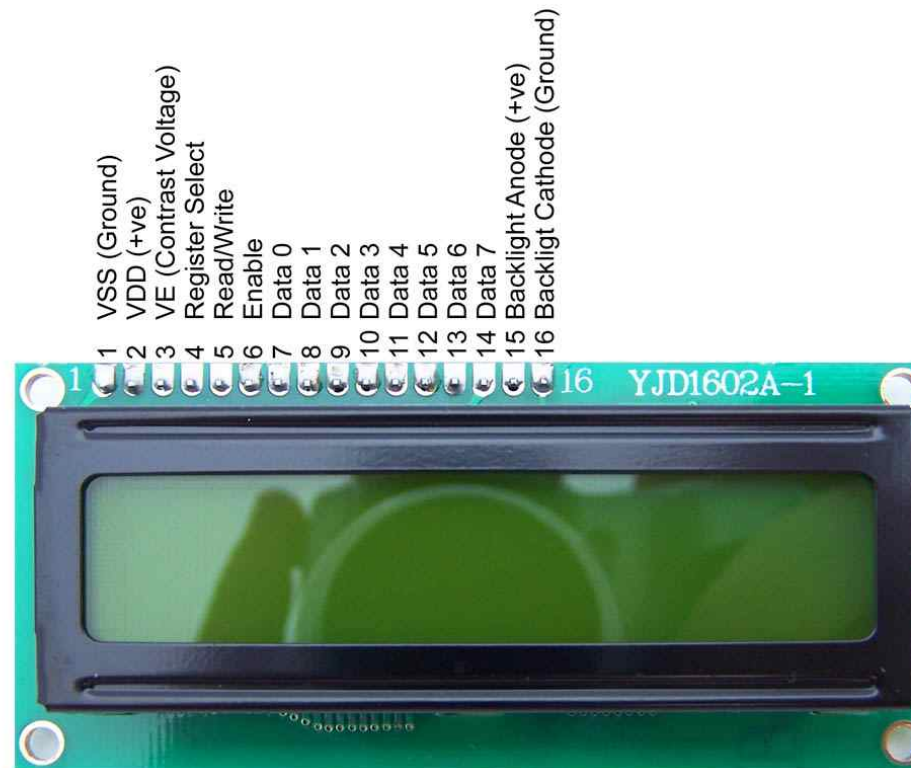
LCD

Dept. of Mech. Robotics and Energy Eng.
Dongguk University



LCD

- The LiquidCrystal library allows you to control LCD displays that are compatible with the Hitachi HD44780 driver.'



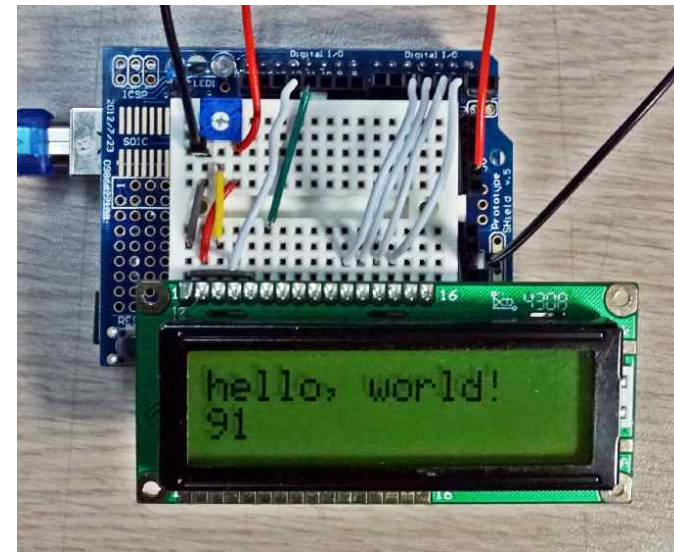
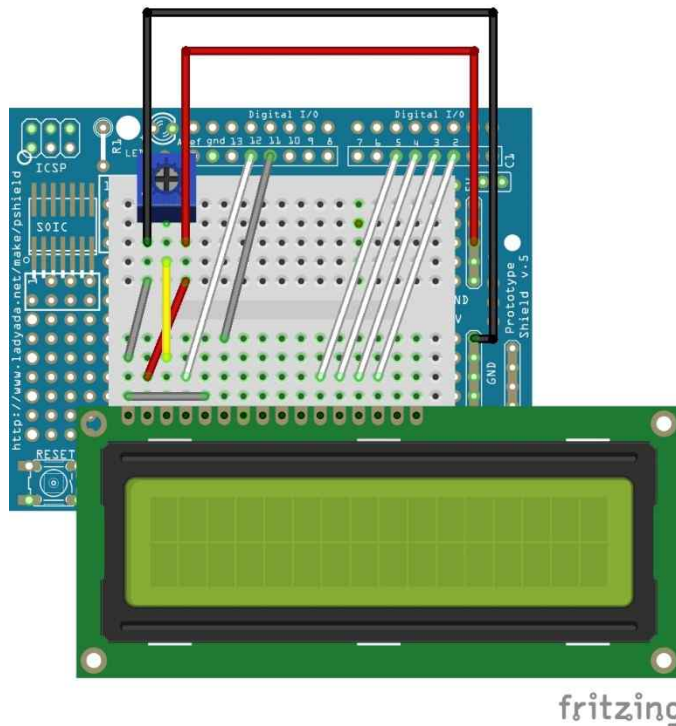
LCD

- The Hitachi-compatible LCDs can be controlled in two modes: 4-bit or 8-bit.
- For displaying text on the screen, we can do most everything in 4-bit mode.



Connecting a LCD display

- Let's connect the adaptor to the Arduino.



Sending out string to the LCD

- Write the following program, compile it and upload.

```
#include <LiquidCrystal.h>
// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup() {
    // set up the LCD's number of columns and rows:
    lcd.begin(16, 2);
    // Print a message to the LCD.
    lcd.print("hello, world!");
}

void loop() {
    // set the cursor to column 0, line 1
    // (note: line 1 is the second row, since counting begins with 0):
    lcd.setCursor(0, 1);
    // print the number of seconds since reset:
    lcd.print(millis() / 1000);
}
```

A Closer Look

- We will use the LCD library by including the following header file:

```
#include <LiquidCrystal.h>
```

- LiquidCrystal lcd(rs, enable, d4, d5, d6, d7)

```
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
```

- rs: the number of the Arduino pin that is connected to the RS pin on the LCD
- enable: the number of the Arduino pin that is connected to the enable pin on the LCD
- d4, d5, d6, d7: the numbers of the Arduino pins that are connected to the corresponding data pins on the LCD.

A Closer Look

- `lcd.begin(cols,rows)` initializes the LCD screen, and specifies the width and height of the LCD.

```
lcd.begin(16, 2);
```

- `lcd.print(data)` prints text to the LCD.

```
lcd.print("hello, world!");
```

A Closer Look

```
lcd.setCursor(0, 1);
```

- Set the cursor to column 0, line 1.
- Line 1 is the second row, since counting begins with 0.

```
lcd.print(millis() / 1000);
```

- lcd.print can display numbers too.

Sending out number to the LCD

- Modify the program like below:

```
#include <LiquidCrystal.h>
// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
int i;

void setup() {
    // set up the LCD's number of columns and rows:
    lcd.begin(16, 2);
    // Print a message to the LCD.
    lcd.print("hello, world!");
}

void loop() {

    for (i=0;i<10;i++){
        lcd.setCursor(0, 5);
        lcd.print(i);
        delay(500);
    }
}
```

A Closer Look

```
for (i=0;i<10;i++){  
    .  
    .  
    .  
}
```

- The for Loop: for(**initialization**, **condition**, **increment**)
- initialization is used to set the loop-control variable to an initial value.
- condition is an expression that is tested each time the loop repeats. As long as it is true, the loop keeps running.
- increment portion increments the loop control variable.